

ABSTRACT OF THE DISCLOSURE

In one embodiment of this invention, the apparatus for sputter deposition within an evacuated volume comprises a compact gridless ion source into which an ionizable gas is introduced and from which ions leave with directed energies at or near the sputtering threshold and a sputter target near that source, biased negative relative to the surrounding vacuum enclosure, and located within the beam of ions leaving that source. Particles sputtered from the target are deposited on a deposition substrate spaced from both the ion source and the sputter target. An energetic beam of electrons can be generated by the incident ions striking the negatively biased sputter target and the deposition substrate is located either within or outside of this beam, depending on whether the net effect of bombardment by energetic electrons is beneficial or detrimental to that particular deposition process.